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STUDIES ON THE GENUS RHYACOPHILA OF CHINA (2)*

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Abstract. Nine new species of the genus *Rhyacophila* are described and figured: *R. peripenis*, *R. nephroidea*, *R. multispinomera*, *R. nanpingensis*, *R. claviforma*, *R. mimiclaviforma*, *R. crispa*, *R. wuyanensis* and *R. haplostephana*.

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Type specimen localities: (1) An-hui, Jin-xian, Song-cun, 8 June 1990, 120 m elev., Coll. Morse, Sun & Yang. (2) An-hui, She-xian, Yan-yuan-xiang, Huang-bo-shan-cun, 21 April 1991, Coll. Li. (3) Gan-su, Ji-shi-shan-xian, 2375 m elev., 24 July 1992, Coll. Sun. (4) Hu-bei, Ma-cheng-xian, 15 km N.E. of Ma-cheng, Zheng-shui-he, 1 km S. of Gui-shan Tea Farm, 13 July 1990, 250 m elev., Coll. Morse & Yang. (5) Jiang-xi, 1 km N. of Tong-mu-guan of Fujian & Jiangxi, 80 km marker, 550 m elev., 29 May 1990, Coll. Sun. (6) Jiang-xi, 38 km N. of Chong-an, 2 km within Jiang-xi, 80 km marker, 550 m elev., 29 May 1990, Coll. Sun. (7) Jiang-xi, Gui-xi-xian, Xi-qí-he, 59 km S. E. of Gui-xi, 5 June 1990, 210 m elev., Coll. Yang. (8) Jiang-xi, Wu-yuan-xian, Qin-hua-he, 37 km N. of Wu-yuan, 25 May 1990, 250 m elev., Coll. Morse, Yang & Sun. (9) Jiang-xi, Wu-yuan-xian, Ju-jin-cun, Yuan-tou-xi, 70 km W. N. of Wu-yuan, 26 May 1990, 280 m elev., Coll. Morse, Sun & Yang. (10) Jiang-xi, Yu-shan-xian, San-qing-shan, Shuang-xi-he, 80 km S. of Yu-shan, 27-28 May 1990, 470 m elev., Coll. Morse & Sun. (11) Si-chuan, E-mei-shan, 3 km W. of Jing-shui, E-mei-he, 910 m elev., 1 July 1990, Coll. Li & Chen. (12) Si-chuan, Nan-ping-xian, Jiu-zhai-gou, Zheng-zhu-tan, 26 June 1990, 2440 m elev., Coll. Yang & Li. (13) Si-chuan, Nan-ping-xian, Jiu-zhai-gou, Shu-zheng-qun-hai, 26 June 1990, 2250 m elev., Coll. Morse. (14) Yun-nan, Ping-bian-xian, A-de-bo-xiang, Kun-he-cun, Kun-he, 19 July, 1990, 1450 m elev., Coll. Li. (15) Yun-nan, Ping-bian-xian, Di-shui-ceng-xiang, Qian-jing-cun, head of Mi-shu-he, 1440 m elev., 22 July 1990, Coll. Ke. (16) Yun-nan, Wen-shan-xian, 5 km N. of Wen-shan-shi, San-jiao-tang, 9 July 1990, 1300 m elev., Coll. Li & Ke. (17) Yun-nan, Wen-shan-xian, Lao-hui, Long-xiang, 2 km E. of Bai-yi-zhai, 10 July 1990, 1650 m elev., Coll. Ke.

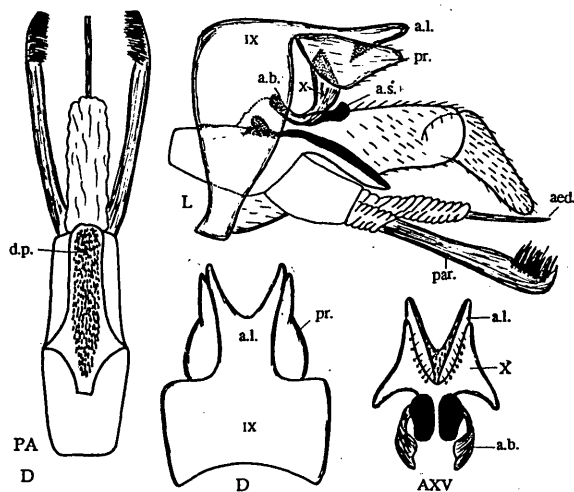
Abbreviations in the figures:

a.b. = apical band; aed. = aedeagus; a.l. = apicodorsal lobe; a.s. = anal sclerite; d.p. = dorsal process of phallic apparatus; h.p. = horizontal part of segment X; par. = paramere; pr. = preanal appendages; t.s. = tergal strap; v.l. = ventral lobe of aedeagus; v.p. = vertical part of segment X. L = lateral view; D = dorsal view; C = caudal view; V = ventral view; PA = phallic apparatus; AXV = apicodorsal lobe, segment X, anal sclerites and apical band, ventral view; AV = apical band, tergal strap and anal sclerites, ventral view.

The type specimens of the new species are kept in the insect collection of the Department of Plant Protection, Nanjing Agricultural University. The terminology for genitalia structure used in this paper follows that of Schmid (1970).

***Rhyacophila peripenis* n.sp. (Fig.1)**

Body length 6 mm, forewing length 7 mm. Body dark brown; antenna yellowish brown; palpi and wings yellowish brown; abdomen dark above and yellow beneath. Male genitalia: Segment 9 shortened ventrally, the apicodorsal lobe concave deeply at the distal end and its two lateral margins parallel to each other. Preanal appendages triangular in lateral view, almost as long as apicodorsal lobe. Anal sclerites short in lateral view and footprint-like in ventral view; apical band broadened at apex in ventral view; tergal strap membranous. Phallobase cylindrical, strongly sclerotized; dorsal process of phallic

Fig.1 *Rhyacophila peripenis* n.sp.

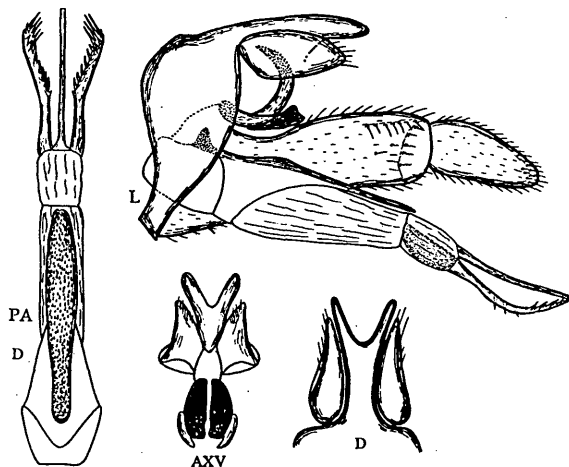
apparatus stout, with two margins parallel each other in dorsal view; endotheca encircling the basal half of the aedeagus; aedeagus tubular; apices of parameres bearing brush-like hairs. The first segment of inferior appendages long, second one short, straightly tapering to blunt apex.

Holotype ♂: loc.1. Paratypes: 1♂ with same data as holotype; 1♂ loc.6; 1♂ loc.9; 3♂ loc.8; 15♂ loc.10; 1♂ loc.5; 1♂ loc.7; all from eastern China. This species is very similar to *Rhyacophila falcifera* Schmid, but differs from the latter in (1) the width of the apicodorsal lobe of segment 9 is 1/2 times as long as its length, rather than 1/3 times as in the latter; (2) the base of second segments of inferior appendages as wide as the distal end of the first segments.

***Rhyacophila nephroidea* n.sp. (Fig.2)**

Body length 6 mm, forewing length 6.5 mm. Body dark brown; basal segments of antenna pale; legs yellow; forewing yellowish brown; abdomen dark above and yellowish brown beneath. Male genitalia: Segment 9 shortened ventrally; apicodorsal lobe long, with its distal end incised deeply in dorsal view. Preanal appendages sub-rectangular, shorter than apicodorsal lobe. Segment 10 curved in lateral view. Dorsal process of phallic apparatus stout, basal third narrower; aedeagus tubular; distal half of parameres divergent in dorsal view. First segment of inferior appendages rectangular, second one elliptical, about half as long as the first segment.

Holotype ♂: loc.14. Paratypes: 2♂, same data as holotype. They are from southwestern China.

Fig.2 *Rhyacophila nephroidea* n.sp.

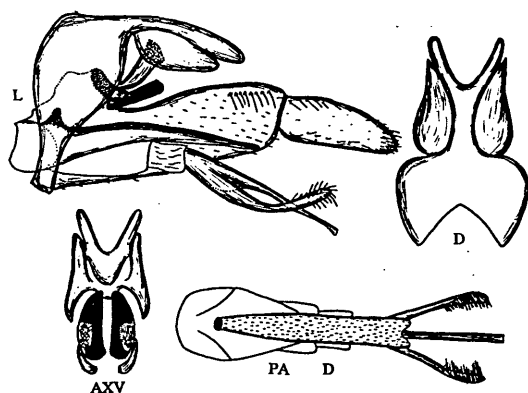
This species is similar to *Rhyacophila yigrongpa* Schmid, but differs from the latter in: the apicodorsal lobe of segment 9 deeply concave and the paramere curved upward in about 50 degree, with spines at the distal half.

***Rhyacophila multispinomera* n.sp. (Fig.3)**

Body length 6 mm, forewing length 7 mm. Body blackish brown. Male genitalia: Segment 9 shortened ventrally; apicodorsal lobe long, bifurcate at its apex in dorsal view. Preanal appendages elliptical in lateral view. Dorsal process of phallic apparatus with lateral margins parallel to each other and apex excised in dorsal view. Aedeagus tubular in dorsal view. Parameres somewhat clavate, hairy at the distal portion. First segment of inferior appendages two times as long as its width in lateral view, second segment slender, narrower than the basal one.

Holotype ♂: loc.15. Paratype: 1♂ with same data as holotype, from southwestern China.

This species is similar to *Rhyacophila yigrongpa* Schmid and the previous new species *R. nephroidea*. It is distinguished from these by the end of the dorsal process of phallic apparatus with a shallow

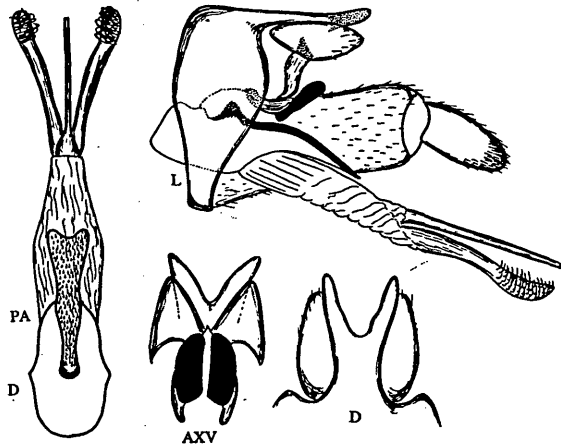
Fig. 3 *Rhyacophila multispinomera* n. sp.

notch and the base of apicodorsal lobe narrow, stem-like.

***Rhyacophila nanpingensis* n.sp. (Fig. 4)**

Body length 6.5 mm, forewing length 8 mm. Body blackish brown, antennal segments annulate with yellow. Male genitalia: Segment 9 shortened ventrally, apicodorsal lobe long, deeply excised in dorsal view. Preanal appendages elliptical. Segment 10 S-shaped in lateral view. Phallobase cylindrical; dorsal process of phallic apparatus sinuate on each side with apex widened and excised; aedeagus tubular; parameres with curl hairs in the distal end. First segment of inferior appendages rectangular; second segment elliptical and half as wide as and half as long as the first one.

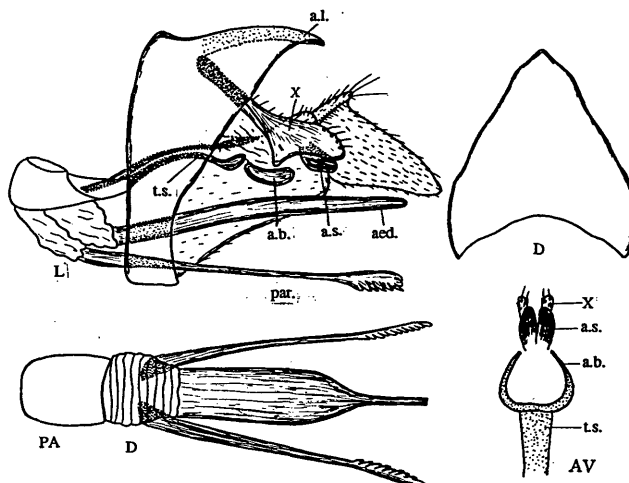
Holotype ♂: loc. 12. Paratypes: 5♂ with the same data as holotype; 2♂ loc. 11. All from southwestern China.

Fig. 4 *Rhyacophila nanpingensis* n. sp.

This species is distinguished from *R. anatina* by (1) the excision of apex of the apicodorsal lobe is deeper than that of the latter; (2) the lateral margins of dorsal process of phallic apparatus are sinuous, with the distal end excised.

***Rhyacophila claviforma* n.sp. (Fig. 5)**

Body length 9 mm, forewing length 10 mm. Body blackish brown; palpi yellowish brown; forewing yellowish brown, scattered with pale spots. Male genitalia: Segment 9 ventrally shortened in lateral view, triangular in dorsal view. Segment 10 oblique in lateral view, with its distal end dilated. Anal sclerites bilobed in ventral view. Apical band nephroid in lateral view. Tergal strap sinuate in lateral view. Phallobase rectangular in dorsal view; aedeagus tubular in lateral view, broad at its basal two thirds, with its distal

Fig. 5 *Rhyacophila claviforma* n. sp.

portion abruptly narrowed; the distal end of parameres bulgy and toothed. First segment of inferior appendages rectangular in lateral view, second one somewhat trapezoid.

Holotype ♂: loc. 13. Paratypes: 2♂ with same data as holotype; 1♂ loc. 12; 1♂ loc. 3; 1♂ loc. 2, from eastern and southwestern China.

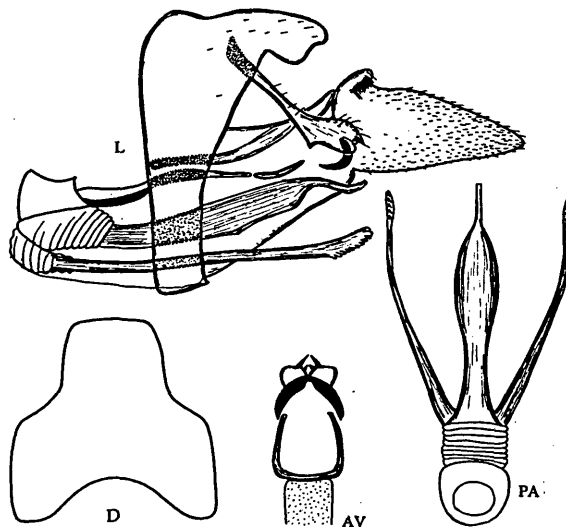
This species is distinguished from *R. kando* Schmid by segment 9 subtriangular in lateral view, aedeagus tubular in lateral view and parameres with teeth at the distal end.

***Rhyacophila mimiclaviforma* n.sp. (Fig. 6)**

Body length 9 mm, forewing length 10 mm. Body blackish brown. Forewing brown, scattered with pale spots. Male genitalia: Segment 9 shortened ventrally in lateral view; apicodorsal lobe truncated. Segment 10 oblique. Anal sclerites crescent. Phallobase small; aedeagus swollen in the basal three quarters, with apical portion abruptly narrowed and sinuate in lateral view; in dorsal view, its middle portion strongly dilated. Parameres tubular with distal end bulgy. First segment of inferior appendages rectangular and the second one triangular in lateral view.

Holotype ♂: loc. 17 in southwestern China.

This species is distinguished from *R. kando* Schmid by the apicodorsal lobe of segment 9 truncated at the end, and parameres only slightly dilated in the distal end other than gradually widened from base to end in the latter.

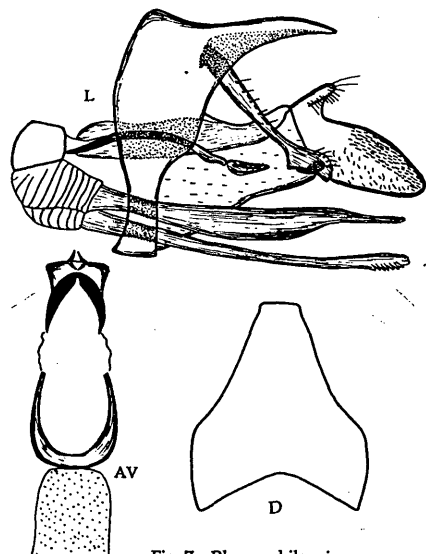
Fig. 6 *Rhyacophila mimiclaviforma* n. sp.

***Rhyacophila crispa* n.sp. (Fig.7)**

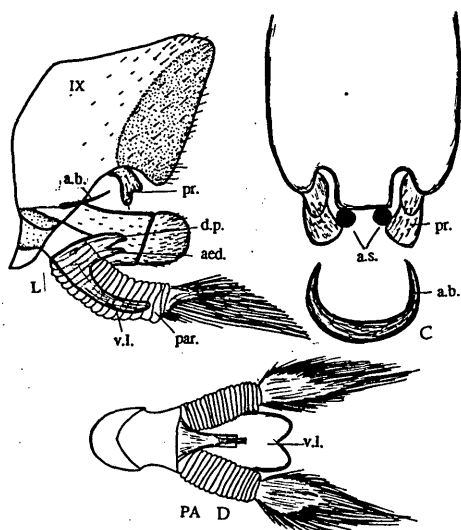
Body length 8,5 mm, forewing length 9,5 mm. Body blackish brown. Forewing with pale spots. Male genitalia: Segment 9 ventrally shortened; apicodorsal lobe triangular, but truncated at apex. Segment 10 oblique in lateral view. Anal sclerites hidden in segment 10 in lateral view. Phallobase rectangular in lateral view; aedeagus widened in the middle and tapering to the end in lateral view; parameres tubular in lateral view and with teeth at the distal end. First segment of inferior appendages rectangular, second one mitten-like.

Holotype ♂: loc.16 in southwestern China.

This species differs from *R.kando* by distal end of the apicodorsal lobe of segment 9 1/3 times as wide as its base, and second segment of inferior appendages mitten-like.

Fig.7 *Rhyacophila crispa* n.sp.***Rhyacophila wuyanensis* n.sp. (Fig.8)**

Body length 6 mm, forewing length 7 mm. Body blackish brown; legs yellow; wings yellowish brown. Male genitalia: Apicodorsal lobe of segment 9 very large, distal margin truncated in lateral view. Preanal appendages set ventrally to the apicodorsal lobe. Anal sclerites are hidden in preanal appendage in lateral view, button-like and separated from each other when viewed caudally. Apical band slender in lateral view. Phallobase cylindrical; dorsal process of phallic apparatus

Fig.8 *Rhyacophila wuyanensis* n.sp.

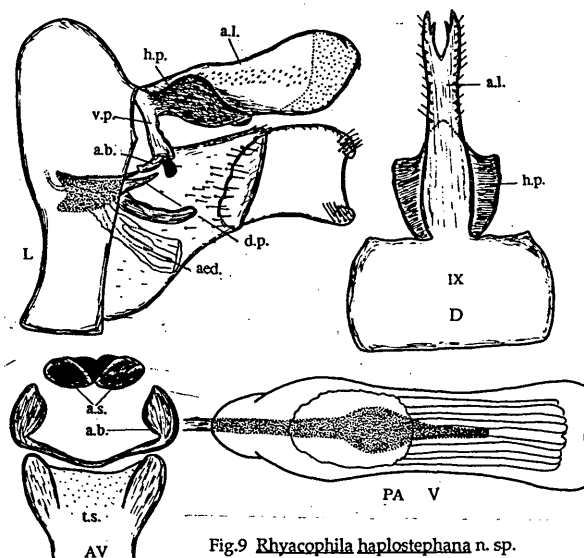
stout, ventral lobe broad and excised at apex; aedeagus short. Inferior appendages shorter than segment 9, first segment rectangular in lateral view, second one semi-circular.

Holotype ♂: loc.8. Paratypes: 1♂, same data as holotype; 3♂ loc.9; 1♂ loc.10, in eastern China.

This species stands apart from other members of the branch by dorsal half of segment 9 broadly truncated and ventral half strongly shortened in lateral view; parameres membranous, distal end with many strong hairs; inferior appendages shorter than apicodorsal lobe.

***Rhyacophila haplostephana* n.sp. (Fig.9)**

Body length 8,5 mm, forewing length 9,5 mm. Body blackish brown; antenna and palpi blackish brown; wing yellowish brown; legs yellow. Male genitalia: Apicodorsal lobe two times as long as the dorsal part of segment 9 in lateral view, in dorsal view its distal end bifurcated, each lateral lobe with a small sub-apicodorsal tooth. Segment 10 composed of two parts; vertical one bar-like. Anal sclerite knob-like, without root in lateral view. Apical band short with its lateral arms swollen. Tergal strap fused into the dorsal process of phallic apparatus. Aedeagus small, enclosed in membrane. Dorsal process of phallic apparatus small, with a banana-shaped process at its base. Both segments of inferior appendages rectangular, but the distal one with two small processes at the upper and lower distal angles separately.

Fig.9 *Rhyacophila haplostephana* n.sp.

Holotype ♂: loc.2. Paratypes: 4♂ with same data as holotype, from eastern China.

The species stands apart from others of the genus by an additional process between aedeagus and dorsal process of phallic apparatus, and by aedeagus submerged within a membrane.

References

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